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Maternal energy intake during lactation and gestation has an effect on leptin levels in the young and adult pups.

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**Background:** Hypercaloric diets during gestation cause adverse effects on metabolic function in the offspring. Leptin is an important adipokine involved with metabolic function, due to the sympathetic signaling of appetite and energy expenditure, but also due to its regulatory role in inflammatory development.

**Objectives:** To elucidate if fetal high-energy insult will affect leptin levels, and the correlation between body-weight and leptin levels in pups.

**Design:** Female rats were fed a conventional (C) or a high fat/high carbohydrate (H) diet for 6 weeks before and during gestation and lactation. The offspring are cross fostered during lactation giving 4 groups of offspring: (maternal diet during gestation/maternal diet during lactation) C/C, C/H, H/C and H/H. After weaning all pups were transferred to a conventional diet until 20 weeks of age. From 20 to 26 weeks of age all pups received a HF diet.

**Results:** At weaning, pups weaned by hypercaloric dams have a significantly higher body weight and leptin levels. Furthermore, leptin levels and body-weight were not correlated in pups born by hypercaloric dams. At 20 weeks of age, pups born by control mothers and weaned by hypercaloric mother still experience an increased leptin level, which is further increased after 6 weeks on a high fat diet.

**Conclusion:** At weaning, leptin-levels in the offspring are independent of body-weight in pups from mothers fed hypercaloric diets during gestation, regardless of postnatal maternal diet. The increased leptin level is maintained in pups born by control mothers and weaned by hypercaloric mothers despite being on a control diet for 16 weeks. This indicates that the maternal diet during weaning period is important for proper leptin signalling in the offspring in adult life.